

Application Number 10/534,633
Amendment dated November 10, 2006
Response to Office action of October 23, 2006

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (previously amended): A thermotunneling device comprising a collector electrode and an emitter electrode, said collector electrode having a surface facing said emitter electrode, characterized in that an insulator layer covers said surface of said collector electrode and is separated from said emitter electrode by a distance d_1 , wherein d_1 is greater than zero.

Claim 2 (original): The thermotunneling device of claim 1 in which the insulator layer comprises a metal oxide.

Claim 3 (original): The thermotunneling device of claim 2 in which the metal oxide is aluminum oxide.

Claim 4 (currently amended): The thermotunneling device of claim 1 in which a[[the]] distance between [[the]]said emitter electrode[[s]] and said collector electrode is in the range of 10 - 200Å.

Claim 5 (currently amended): The thermotunneling device of claim 1 in which [[the]] d_1 distance between the emitter and the insulator layer is in the range of 5 - 50Å.

Claim 6 (original): The thermotunneling device of claim 1 in which the emitter electrode comprises a metal.

Claim 7 (original): The thermotunneling device of claim 1 in which the collector electrode comprises a metal.

Claim 8 (currently amended): A method for enhancing electron tunneling between an emitter and collector electrode, said collector electrode having a surface facing said emitter electrode, comprising the step of covering said surface of said collector electrode with an insulator wherein said insulator is separated from said emitter electrode by a distance d_1 , wherein d_1 is greater than zero.

Claim 9 (original): The method of claim 8 in which the insulator layer comprises a metal oxide.

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Claim 10 (original): The method of claim 9 in which the metal oxide is aluminum oxide.

Claim 11 (currently amended): The method of claim 8 in which said ~~covering~~^{placing} step comprises placing the insulator between 5 and 50Å from the emitter electrode

Claim 12 (original): The method of claim 8 additionally comprising the step of placing the collector electrode between 10 and 200Å from the emitter electrode.

Claim 13 (original): The method of claim 8 in which the emitter electrode comprises a metal.

Claim 14 (original): The method of claim 8 in which the collector electrode comprises a metal.

Claim 15 (previously amended): A method for cooling comprising the steps:

- (a) applying a bias voltage to an emitter electrode;
- (b) placing a collector electrode a distance d_0 from the emitter electrode;
- (c) placing an insulator layer a distance d_1 from the emitter electrode, wherein d_1 is greater than zero; and
- (d) contacting the insulator layer and the collector layer,

whereby electrons tunneling from the emitter electrode to the collector electrode and the emitter electrode thereby cooling the emitter electrode.

Claim 16 (original): The method of claim 15 in which d_0 is in the range of 10 - 200Å.

Claim 17 (original): The method of claim 15 in which d_1 is in the range of 5 - 50Å.

Claim 18 (original): The method of claim 15 in which the insulator layer comprises a metal oxide.

Claim 19 (original): The method of claim 18 in which the metal oxide is aluminum oxide.

Claim 20 (original): The method of claim 15 in which the emitter electrode comprises a metal.

Claim 21 (original): The method of claim 15 in which the collector electrode comprises a metal.